Abstract

PUBLICATIONS

Three-dimensional display system for medical imaging with computer-generated integral photography

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Abstract:
A 3D display system for medical image by computer-generated integral photography (IP) has been developed. A new, fast, 3D-rendering algorithm has been devised to overcome the difficulties that have prevented practical application of computer-generated IP, namely, the cost of computation, and the pseudoscopic image problem. The display system as developed requires on ly a personal computer, a liquid crystal display (LCD), and a fly's eye lens (FEL). Each point in 3D space is reconstructed by the convergence of rays from many pixels on the LCD through the FEL. As the number of such points is limited by the low resolution of the LCD, the algorithm computes a coordinate of the best point for each pixel of the LCD. This reduces computation, performs hidden surface removal and solves the pseudoscopic image problem. In tests of the system, the locations of images projected 10-40 mm distant from the display were found to be less than 2.5 mm in error. Both stationary and moving IP images of a colored skull, generated from 3D computerized tomography, were projected and could be observed with motion parallax within 10 degrees, both horizontally and vertically, from the front of the display. It can be concluded that the simplicity of design and the geometrical accuracy of projection give this system significant advantages over other 3D display methods.

Order